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Developing Job Aids to Increase Adherence to an Antibiotic Regimen in Children with Pneumonia in Niger

Wendy Newcomer Edson
Maina Boucar
Peggy Koniz-Booher
Sabou Djibrina
Ibrahima Mahamane

September 2004





TEL (301) 654-8338
FAX (301) 941-8427
www.qaproject.org



The Quality Assurance Project (QAP) is funded by the U.S. Agency for International Development (USAID) under Contract Number GPH-C-00-02-00004-00. The project serves developing countries eligible for USAID assistance, USAID Missions and Bureaus, and other agencies and nongovernmental organizations that cooperate with USAID. QAP offers technical assistance in the management of quality assurance and workforce development in healthcare, helping develop feasible, affordable approaches to comprehensive change in health service delivery. The project team includes prime contractor University Research Co., LLC (URC), Initiatives Inc., and Joint Commission Resources, Inc. The work described in this report was carried out by the Quality Assurance Project under USAID Contract Number HRN-C-00-96-90013, managed by the Center for Human Services, URC's nonprofit affiliate, in partnership with Joint Commission Resources, Inc. and Johns Hopkins University.



Abstract

The development of antimicrobial resistance (AMR) has increased the worldwide threat of infectious disease. Strategies to curb the development of AMR include improving (1) patient counseling and (2) antibiotic regimen adherence. The purpose of this study was to develop job aids to enhance parental compliance with antibiotic regimens (specifically cotrimoxazole) for the treatment of pneumonia in children in the Dosso Region, Boboye District, of Niger.¹

As a first step, a qualitative methodology was used to assess parental knowledge of respiratory infection, medications (specifically antibiotic therapy), traditional remedies, health-seeking behavior, cultural beliefs about wellness and illness, traditional dissemination of information, and the appropriate way to deliver a message to caretakers of children. Observation of health center activities included patient counseling, availability and/or quality of counseling materials, and the number and duration of antibiotic stock outs.

The findings of the first step were presented in a workshop for Ministry of Health personnel in Niger. Workshop participants developed key messages, which resulted in several ideas for job aids for both health workers and caretakers. These ideas included a counseling card and poster for health workers and a medication envelope with images from the counseling card/poster for mothers. Draft versions were tested,

¹ A paper with further analysis of the work reported here has been published: Edson et al. (2003).

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Abstract *Continued*

modified, and retested prior to production.

The assessment of parental knowledge showed that although most women understood the antibiotic regimen when leaving the health center, only half could recall the correct information three days later during a home visit. Both women and men thought that cotrimoxazole was very effective in treating pneumonia, but traditional remedies were often used before taking a child to the health center. Women were dependent on men to provide for the cost of a clinic visit and/or medication for their children. Cotrimoxazole could be purchased more cheaply in the market than at the health center. Health workers often did not counsel on how to prepare and administer the antibiotic or verify the mother's comprehension of such counseling. Medication in the home was not stored out of the reach of children, and little or no emphasis was placed on completing the prescribed drug treatment.

The job aids described in this report were designed to improve both patient counseling by health workers and caretaker adherence to an antibiotic regimen. Key messages on adherence with an antibiotic regimen can be conveyed to women through simple images and through their reinforcement with verbal messages from health workers.

Acknowledgements

The authors wish to thank our partners at the Niger Ministry of Public Health, especially Dr. Hamsa Sala, Omar Haougi, and Boureima Yayé at the District of Boboye; Omar Djadjé Yéro at the Department of Dosso; Dr. Aminata Konaté and Dr. Herbert Degbé of IMCI; and the project's technical committee: Dr. Soumana Ousseini, Director of Health Education; Hassane Moussa, Director of Health and Reproduction; Issa Kanta, National System for Health Information; and Ousmane Oumarou, Director of the National Project for Primary Health Care.

The project benefited from the timely and expert drafting of images by the artist Mahamadou Nadéré. We would also like to thank the data collectors: Abdoul Moumouni Nialli Ali, Djamilia Amadou Ahidjo, Hadiza Honoré, and Mamane Amadou.

Finally we would like to acknowledge the assistance of the families and community leaders in the towns of Kiota and Boboye who so kindly gave of their time to answer questions and review the job aids.

Partners

IMCI and Health Education Department, Ministry of Public Health, Niger; USAID Infectious Disease Initiative; and the Quality Assurance Project.

Recommended citation

Edson WN, Boucar M, Koniz-Booher P, Djibrina S, and Mahamane I. 2004. Developing job aids to increase adherence to an antibiotic regimen in children with pneumonia in Niger. *Operations Research Results*. Bethesda, MD: Published for the U.S. Agency for International Development (USAID) by the Quality Assurance Project (QAP).

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Abbreviations

AIDS	Acquired immunodeficiency syndrome
AMR	Antimicrobial resistance
ARI	Acute respiratory infection
DES	Department of Health Education
GTZ	German Agency for Technical Cooperation
IMCI	Integrated Management of Childhood Illness
IPC	Interpersonal communication
MOH	Ministry of Health
ORS	Oral rehydration solution
QAP	Quality Assurance Project
STD	Sexually transmitted disease
UNICEF	United Nations Children's Fund
USAID	U.S. Agency for International Development
WHO	World Health Organization

I. Background

The U.S. Agency for International Development (USAID) provided funding to the Quality Assurance Project (QAP) in 2000 to apply quality assurance methods to the problem of antimicrobial resistance (AMR). Subsequently, QAP received approval from the Niger Ministry of Health (MOH) to work cooperatively with it on the problem in Niger. Specifically, QAP and the MOH were to develop job aids to increase the adherence of patients in Niger to the recommended regimen for cotrimoxazole for childhood pneumonia. Poor patient adherence to prescribed drug regimens has been identified as one of the factors linked to AMR; its correction has been recommended as a key strategy for reducing AMR, in addition to its treatment benefits (WHO 2001; USAID 1998).

The use of vaccines, another key strategy to decrease AMR, is currently not feasible in Niger, where neither the *Haemophilus influenzae* type b nor the pneumococcal vaccine is in widespread use.

II. Introduction

Job aids have been widely used to enhance the performance of workers, both in the health field and

beyond. Among healthcare providers, they have been shown to (1) enhance performance by reducing errors caused by poor recall and faulty decision making, (2) promote compliance with standards, and (3) reduce costs of training and retraining. Job aids provide reminders and information as needed, and they substitute for experience or training (Knebel 2000). QAP has developed several successful job aids for health workers, including a case management map for pre-eclampsia in Uganda that helps hospital staff remember and document care (Kerstiens et al. 2003) and a poster depicting correct medication and dosage for malaria treatment in Kenya (Tavrow et al. 2002 and 2003). In some settings, job aids have been more effective with health workers of lower educational level and experience than workers of a higher level.

In the health field, job aids have also improved client performance. For example, in a U.S. study, parents of children who were prescribed an antibiotic suspension were given a syringe with a line marked at the correct dose and a demonstration of how to administer the antibiotic. Parents with the syringe were better able to correctly administer the oral antibiotic at home as compared to parents with only verbal instructions and no syringe (McMahon, Rimsza, and Bay 1997). In another study, however, the use of an oral syringe to deliver antibiotic medication did

not increase caretaker adherence as compared to use of a teaspoon (Ellison and Altemeier 1982). Another study developed educational materials that focused on medication for illiterate consumers in Pakistan: Although mothers understood pictures describing the dose of a medicine, they had trouble understanding frequency and duration of therapy from the pictures (Nisal et al. 1997). Child nutrition cards maintained by mothers and instructions for preparation of oral rehydration solution (ORS) are also examples of client-based job aids.

There is growing understanding about AMR and the role of adherence to antibiotic regimens to its reduction. Resistance of *S. pneumonia* to penicillin and other agents has been documented in the U.S. (Knapp and Schutze 1997; Doern et al. 1996). Recent studies have documented growing resistance of *S. pneumonia* in Africa to penicillin and cotrimoxazole (Scott et al. 1998 in Kenya; Koornhof, Wasas, and Klugman 1992 in South Africa; Huebner et al. 1998 in Botswana). Resistance of *S. pneumonia* to cotrimoxazole in Niger has been reported (Dr. Djbo Saacou, personal communication, April 27, 2000). A recent study there found that caretakers understood more often the dose and frequency of the antibiotic regimen than the duration of treatment (DSNIS 2000). The mechanisms of antibiotic resistance have been described, including changes in penicillin-binding proteins, production of beta-lactamase, alterations in target enzymes, and inhibition of drug access to the site of action (Hoppe and Johnson 1998).

Nasopharyngeal carriage rates and resistance patterns of *S. pneumoniae* are key factors in community-acquired infection. Since the pneumococcus is transmitted from person to person, asymptomatic carriers are an important source of infection. A promising public health strategy to curb resistance may be the use of the pneumococcal vaccine, which targets serotypes accounting for the majority of resistance. Vaccination also protects against the nasopharyngeal carriage of these vaccine serotypes (CDC 2000).

The development of most successful job aids follows scientific principles based on models of behavior change (Lahaie, Burkhalter, and Kelley 2001). The Diffusion of Innovation model (Rogers 1995) describes how innovations are communicated, adopted, and given up by individuals in a social group. Intrinsic features of an innovation affect the rate and process by which people encounter and use new ideas and products. A slightly different model (Prochaska and DiClemente 1986) posits five distinct stages of readiness to change (precontemplation, contemplation, preparation, action, and maintenance) that are really a continuum; an individual's transition between stages is a process influenced by his or her personal experience and environmental factors. A third model, health education, emphasizes deficits in knowledge and skills (Green et al. 1980). Moore (2001) incorporates the know-how of high-performing practitioners into job aids, uses pretesting in a job aids' design, and relies on authority figures such as supervisors in the implementation process. He stresses that job aids are not appropriate for all tasks.

III. Purpose of the Study

This study sought to develop a client-based job aid to enhance parental compliance with antibiotic regimens (specifically cotrimoxazole) for the treatment of pneumonia in children in the Dosso Region, Boboye District of Niger. The World Health Organization (WHO) has identified as a knowledge gap the research question, "What patient educational materials and other supportive tools impact optimally on patient behavior with respect to antimicrobial use?" This study relied on information in the job aid literature cited above, especially that related to healthcare and scientific principles that have proven successful in the design and implementation of job aids, to contribute to answering WHO's question.

IV. Description of the Study Site

QAP has a regional office in Niger, the site of the study. A landlocked state in West Africa, Niger is also the largest state in the region, covering about 500,000 square miles. It has few natural resources, although it has uranium, and a rapidly increasing population (total fertility rate = 7.3, 1995). The infant mortality rate is 123 per 1,000 live births (Attama et al. 1998), among the world's highest.

Health services are structured in a pyramid fashion with tertiary referral services and specialized care offered through three hospitals in Niamey, the capital. At the regional level, a hospital center handles referrals from arrondissement-level medical centers. At the

arrondissement level, primary healthcare and first referral services are provided by the medical center. At the commune level, rural dispensaries provide primary healthcare services. The primary study site was the health center in Boboye District (Birni N'Gaouré) and another in neighboring Kiota District, both in the Dosso Region, located 100 kilometers east of Niamey.

Boboye District is home to 254,603 inhabitants in a 4,423-square kilometer area (42.9 inhabitants per square kilometer). This includes 11,551 infants from birth to 11 months, 40,797 children from one to four years, and 54,068 women of childbearing age. The principal diseases are acute respiratory infection (ARI), diarrhea, malaria, and sexually transmitted diseases/acquired immunodeficiency syndrome (STDs/AIDS). Schistosomiasis, onchocerciasis, and dracunculiasis are endemic. There are three language and ethnic groups (Djermas, Peuls, and Haoussa); the religion is predominantly Muslim. The literacy rate is 18%. Agriculture, animal husbandry, and fishing are the primary economic activities.

Boboye District experienced 5,452 cases of pneumonia in children aged 0 to 5 years during 1999 (Table 1).

The Niger guidelines for the Integrated Management of Childhood Illness (IMCI) call for the use of cotrimoxazole as the first drug for the treatment of pneumonia and amoxicillin as the second. Pediatric suspensions are rarely available.

The Quality Assurance Project in Niger, 1992–1998, was a collaborative effort with the Niger MOH. Its objective was to improve the delivery of critical primary

Table 1
ARI by Diagnosis: Boboye District Children 0–5 Years (1999)

Diagnosis	Jan.–March	April–June	July–Sept.	Oct.–Dec.
Pneumonia	1,723	1,051	904	1,774
Cough	820	327	624	48
Otitis	NA	NA	54	48
Sore throat	NA	NA	12	14
Sore ear	NA	NA	30	34
Other ARI	1,600	154	81	87

healthcare services by integrating and institutionalizing the quality assurance approach. Over 60 quality improvement teams were formed in Tahoua Region, resulting in improvements in family planning, prenatal care, growth monitoring, nutritional rehabilitation, tuberculosis treatment, malaria case management, and other areas. Job aids were developed to assist in tuberculosis and malaria case management.

V. Methods

This study had two research phases. The first, the formative research reported here, was conducted to determine the messages to be conveyed by job aids, what type of client-based job aid would be most appropriate at the study site, and whether an additional intervention was needed. At the completion of this phase, fully developed job aids were ready for use in a health clinic setting. Phase 2, testing the job aids' effectiveness in improving health worker ability to counsel and caretaker compliance with the antibiotic regimen prescribed for pneumonia, is reported elsewhere (Edson et al. 2003).

A qualitative methodology was used in focus groups and key informant interviews to assess parental knowledge of common respiratory infections, medications (specifically antibiotic therapy), traditional remedies, health-seeking behavior, cultural beliefs about wellness and illness, traditional dissemination of information, and the appropriate way to deliver a message to caretakers of children. Both men and women participated in separate focus groups. The form used by focus group leaders to report the information generated by each group is in Appendix A; the key informant interview form is in Appendix B.

At two health centers in Boboye and Kiota, we reviewed counseling materials and observed patient counseling, how the medication was given to the caretaker, what instructions were given, and how the medication was administered to the child. Data were collected on the number and duration of antibiotic drug stock outs and compliance with IMCI guidelines. Expert clinicians were interviewed and asked their techniques and suggestions for improving the counseling of caretakers.

Caretakers of children with pneumonia were identified during clinic visits and asked to participate in the study. Participants were asked about their knowledge of the antibiotic after the clinic and were visited in their homes three or four days later. Observations in the home were made to assess parental behaviors related to medication administration.

The study instruments were developed with guidance and input from the national director of IMCI and the regional health team in Boboye. Six themes guided the data collection: (1) knowledge and attitudes concerning general childhood illnesses, (2) knowledge of danger signs and treatment of respiratory illness, (3) care-seeking behaviors (use of modern versus traditional medicines and modern versus traditional healthcare practitioners/facilities), (4) compliance with recommended antibiotic regimens for the treatment of pneumonia (barriers, difficulties), (5) sources of health information and popular communication channels, and (6) understanding/comprehension of language (written and verbal) and imagery. Instruments were developed in English and were translated to French and then to two local languages: Djerma and Peul.

Study approvals were obtained from USAID, Washington; the Niger MOH; and the regional medical director. The local health committee in Boboye reviewed the study to ensure that it met local standards for ethics, culture, language, gender concerns, and research procedures. Four data collectors were trained: two men and two women. Only female data collectors conducted focus groups of women, and only male collectors did so for men. At the request of the Boboye health committee, female data collectors conducted all home visits. Data were

stored to protect respondents' anonymity. Analysis consisted of a constant comparison method producing themes from the data. A descriptive analysis was completed of data from observational checklists. Information from previous studies in Niger was assessed for its relevancy to the current study.

VI. Results

A. Summary of Results

Although most women understood the antibiotic regimen when leaving the health center, only half could recall the correct information three or four days later during a home visit. Women in Boboye who received packets of medication with markings indicating the correct dose remembered it more often than women in Kiota who received only verbal instructions. Both women and men thought that cotrimoxazole was effective in treating pneumonia, but they often used traditional remedies before taking a child to the health center. Women were dependent on men to pay for a clinic visit and/or medication for their children. Health workers often did not counsel on how to administer the antibiotic or verify the mother's comprehension of such counseling. During the previous year, all clinics in the district experienced a stock out of cotrimoxazole. It could be purchased more cheaply in the market

than at the health center. Medication in the home was not stored out of the reach of children.

B. Study Sample

The study sample comprised 21 key informants, eight separate focus groups of men and women, four interviews with health workers, 32 clinic visit observations, 32 exit interviews with mothers of children with pneumonia, and 16 household observations of mothers giving medication to children with pneumonia. Table 2 describes the study sample by study site.

Study staff identified types of key informants, and each health center's supervisory health team identified participants fitting the categories

Table 2
Description of Study Sample by Site

Target Group	Boboye	Kiota	Total
Key informants:	10	11	21
Neighborhood chairman	3	3	6
Health committee member	1	1	2
Traditional practitioner	2	2	4
Pharmacist	1	2	3
Government worker	2	1	3
Association member	1	2	3
Health worker interviews	3	1	4
Health worker observations	16	16	32
Exit interviews with mothers	16	16	32
Observations of mothers at home	8	8	16
Focus groups: Total*	4	4	8
Men	2	2	4
Women	2	2	4

* Number of focus groups with 10 to 20 participants in each.

requested for each study site. Key informants were interviewed first and provided information to guide the study team's approach in the community. If two or more individuals could have served as the key informant, the study supervisor selected one based on availability and the representation of each neighborhood.

Observation of clinic visits at the health center occurred next. Children with a cough were identified among those waiting to be seen, and a regional MOH supervisor observed their visits, using a checklist (Appendix C). When the observations were complete, a data collector interviewed each health worker. The observed children's caretakers, all of whom were women, were asked if they would be willing to participate in the study. If so, a short questionnaire was administered to them and an appointment was set for a home visit. These mothers were visited in their homes three or four days later, when they were observed giving the antibiotic to their child.

At the same time, other data collectors, specifically trained in focus group facilitation, and the study supervisor conducted eight focus groups: four all men and four all women. As requested by the chief of the village, his intermediary selected the home where each focus group was held and asked the women and men to participate in them. Each group had 10 to 20 persons. The team collected data in Boboye for two weeks and then in Kiota during the following two weeks.

C. Clinic Visit Observations

The welcome given to caretakers (defined as an exchange of saluta-

tions and the offer of a chair to sit in) was good at both sites (31/32). However, the health worker assessed the weight-for-age of the infant in only 4 of the 32 cases (12%) of observed clinic visits. Similarly, in only two of the 32 observed visits (6%) were the four danger signs assessed. However, at least two danger signs were assessed in 10 of 32 visits (31%). None of the observed exams of children with cough were completed correctly. For example, the health worker counted respirations in only 14 of 32 observed visits (44%), assessed intercostal retractions in 14 of 32 visits (44%), and never assessed for stridor or wheezing.

In most clinic visits (25/32; 78%), the medication given was appropriate for the diagnosis. However, in only 11 of 32 clinic visits (35%) did the health worker tell the mother about two danger signs for which she should bring the child back to the clinic. Only 14 of 32 mothers (44%) were told when to return to the clinic for a follow-up appointment.

At both sites antibiotics were packaged during the clinic visit in paper cones fashioned by the health worker. Instructions consisted of the dose, the number of doses per day, and the number of days to give the antibiotic. Health workers wrote symbols (slashes and plus marks for each day) four out of 32 times (12%) or wrote in French six out of 32 times (19%) on the cones to indicate the antibiotic dose and number of days. Some Kiota health workers used colored paper in two visits out of 15 (13%) to indicate number of doses per day but gave only verbal instructions in the remaining visits.

In only two of the 32 visits (6%) did the health worker demonstrate giving the first dose to the child

during the visit, and no one ever discussed how to store, crush, mix, and administer the medication. In only half (16/32) of the clinic visits did the health worker verify the mother's comprehension of the dose and frequency. The health worker verified that the mother understood the number of days to give the medication in only 12 clinic visits. None of the health workers asked the mother if she had any questions. However, in 44% (14/32) of the visits, the health workers did ask open-ended questions, enabling them to correct or clarify the mother's understanding. Questions were clear in 75% (24/32) of the visits, and the health worker had a positive attitude in 69% (22/32) of the visits. None of the health workers had trouble communicating due to difficulties in the local language.

D. Exit Interviews with Caretakers at the Health Center

All of the mothers whose children were observed during clinic visits agreed to be interviewed. When asked how many days they had waited to bring their child to the clinic, 11 of 31 (35%) said they had waited more than three days (range: less than one day to 60 days). Before coming to the health center, nine of 32 women sought treatment elsewhere (two from traditional practitioners, five from a pharmacy, one from a religious leader, and one from a community health worker). The five women who went to a pharmacy spent from 35 to 100 CFA² for treatment; the community health worker did not charge. Eleven

² At the time of the study, US\$ 1.00 = approximately 650 CFA.

children received acetaminophen at home before coming to the health center. Of the 32 women, 22 said the child's father decided when to bring a sick child to the health center; other women said they decided themselves (nine) or the child's paternal grandparent did (one).

Questioned about their understanding of the dose, number of doses per day, and the number of days to give the antibiotic, 31 of 32 mothers answered correctly, although only nine (28%) could explain the reason for the medication. Twenty-nine of 32 mothers (91%) knew at least two danger signs, and 28 of 32 knew at least two ways to manage the child's illness at home. The exit interviews indicated that all women who received medication at the health center paid for it (range: 100 to 700 CFA); all but five knew when to return for follow-up.

Asked whether they had suggestions on how to improve the health service they had just received, only one mentioned the lack of respect shown by the health worker, three mentioned having to pay for the consultation, and one was noncommittal.

E. Observations of Caretakers at Home

Of the 27 mothers who received an antibiotic for to their child, 16 agreed to be visited at home. Of those who refused, five declined as their husband was absent, one declined as her home was difficult to reach, and five gave no reason. Home visits were conducted at a median of the third day of treatment (mean of 4.1 days of treatment).

Of the 16 mothers visited at home, only eight (50%) correctly remem-

bered the prescribed dose of antibiotic. Fewer mothers in Kiota (two in eight) remembered the dose as compared to Boboye (six in eight). However, a count of the remaining pills indicated that 13 of 16 mothers had given the correct amount. Of those who did not, one had forgotten, and the other two had stopped as the child was better.

Administration of the cotrimoxazole tablet observed at home occurred as follows: The mother crushed the tablet in a spoon using a finger of her right hand and water that was at her side; as she was sitting on a mat, she gave the medication to the infant who was reclining on the mother's legs in front of her. Some women used the bottom of a glass to crush the pill, while others used the back of a spoon. Most women used well water to mix the crushed medication. Most used a spoon to give the antibiotic to the child, although one used a "louche" (gourd) and two others a glass. Mothers made sure that the infant had swallowed the antibiotic by looking to see if any was left in the glass, by making sure that none had spilled, and by noting whether the child had begun crying, a sign that he or she had swallowed everything. Only three of the 16 did not verify that the infant had swallowed the antibiotic.

When asked, the mother showed the data collector where the antibiotic was stored. Of the 16 women observed, four stored it in a dresser drawer, four out on a table, three in a cup, three in a basket, one in the folds of her skirt, and one in her wallet. Besides cotrimoxazole, households had other medications in storage, including paracetamol, chloroquine, ORS, aspirin, tetracycline, and ampicillin. During home

visits, the women indicated that they spent from 125 to 425 CFA each on the cotrimoxazole.

F. Health Worker Interviews

Only about half of the health workers had been trained in IMCI. They said that their training did not cover counseling or interpersonal communication (IPC).

At Boboye, the health worker gives the medication to the mothers, but not at Kiota, where all health workers take turns attending a room where medication is dispensed. In addition to cotrimoxazole for the treatment of pneumonia, the health workers use penicillin G injections and amoxicillin.

Health workers reported different methods of giving medication to the mothers: At Boboye, the pills are put in a paper cone on which signs are written indicating the number of pills a day. The number of days of treatment is given verbally. At Kiota, the pills are broken and put into paper cones of different colors, indicating the number of doses per day. The mother starts the treatment at the health center.

One health worker said that he gave no instructions to the mothers on how to administer the medication.

If a mother returned with a child who had not improved, the health worker would:

- Verify that the mother had really given the pills;
- If she had not or if the pills had been incorrectly given, the health worker would give her another course of the same medication, with additional counseling;

- If the treatment had been followed, the health worker would change the treatment; and
- If all of these steps had not worked, the child would be referred to a physician.

Although all of the health workers had invited the mothers to return for a follow-up appointment, these workers said there was little chance the mothers would do so. The workers identified several factors preventing follow-up: in Boboye, distance, lack of transportation money, ignorance, and poverty; in Kiota, distance, mothers having to stay home to work, absence of husband, insecurity on the routes, negligence, the use of medicine from Nigeria available in the local market, and lack of money.

G. Themes for the Qualitative Analysis

The six themes listed in Section V, "Methods," were used to mine information that would be useful in the development of the job aid. Information about each theme is described below by data source.

1. Key informants

Knowledge and attitudes concerning general childhood illnesses:

Key informant healthcare providers were concerned that many children were sick throughout the year; they were also aware of the principal childhood illnesses. For example, they cited ARI during the cold season, malaria during the rainy season, and meningitis during the hot season as important diseases, with diarrhea, measles, polio, and guinea worm occurring throughout the year. One saw illness as an act of God: "It is God who knows

because you know that illness does not announce itself and that one can never know who will be sick."

Knowledge of danger signs and treatment of respiratory illness:

According to key informants, treatment was accomplished with both modern and traditional medicines and medicinal products from Nigeria. Health workers and pharmacists prescribed modern medication. However, at Kiota, the person in charge of the community depot only dispensed medications according to a prescription. Elderly healers and religious leaders prescribed traditional medicine.

Care-seeking behaviors (use of modern versus traditional medicines and modern versus traditional healthcare practitioners/facilities): Treatment is sought at health centers, at pharmacies, at the community depot in Kiota, in the market place, from traditional healers, from religious leaders, and by self-medication in the countryside. Self-medication is frequently practiced before taking a child to the health center, which sometimes results in the child's arriving in a serious state. Modern medicine is used the most.

Factors that encourage the use of traditional medicine are its easy accessibility and low cost. Factors that encourage the use of modern medicine are its effectiveness, the qualifications of health workers, and better case management and health education. Factors that prevent the use of traditional medicine are its ineffectiveness and inaccurate dosage. Non-use of modern health services is due to the expense of cost recovery,³ its perceived high cost, distance to health centers and lack of transportation, ignorance of

the population, poverty, daily work required of wives, existence of modern pills in the market at low cost, and poor reception from the health workers.

Key informants indicated that the husband makes the decision about when to take a child to the health center because he has to bear the cost. They also said that the president of the health committee and the directors of the village associations sometimes intermediate between the population and the health center, settling some disputes. However, there was some indication that they do not play this role effectively.

Compliance with recommended antibiotic regimens for the treatment of pneumonia (barriers, difficulties):

Key informants recognized cotrimoxazole as a treatment for ARI. Medication intended specifically for children included syrups, ORS, and pectoral syrup. The fact that there are no traditional medicinal products specifically for children was important to the job aids development.

Sources of health information and popular communication channels:

Women used the health center, health education meetings, and baptisms as sources of information on health matters, while men used the mosque, radio, and neighborhood meetings.

Understanding/comprehension of language (written and verbal) and imagery:

Words for key ARI-related terms were identified as one step in the process of developing the job aids and are provided in Table 3.

³ Cost recovery, a system of payment at government health clinics, was instituted throughout Niger in 1998.

Table 3
Local Vocabulary Used to Identify Types of ARI

Sickness	Name in Peul	Name in Djerma	Name in Haoussa
Cold	Mura	Sarku-sarku Hungum Mura	Majina
Cough	Doddjol Doiru	Koto	Twari
Pneumonia	Doiru maudu Gabaaré naodji	Hungum bero Koto bero Ganda dori	Ciwon gaba
Bronchitis	Gandéré naoré Nawool bècè Betché naodji	Gandé-doori Kerew dori	Ciwon awazzay
Otitis media	Nawool noppi Noppi naodji	Hanga doori	Ciwon kunney

We also determined that the population had seen images for AIDS, leprosy, family planning, polio, tuberculosis, and diarrhea, so we believed that the level of visual literacy was adequate for our purposes.

2. Focus groups

Eight focus groups were conducted: four each with men only and women only.

Knowledge and attitudes concerning general childhood illnesses:

Both men and women in focus groups said that their children are sick year round, but especially during the rainy season, the cold season, and the hot season. Fathers remarked that the children also fall ill during weaning.

The focus groups indicated that to prepare to give a tablet to an infant, caregivers would first put it into a spoon, a louche, or a glass and then crush it with a spoon or finger, adding liquid to help dissolve it. For

a four-year-old child, they would put the tablet in the child's mouth. In the majority of cases, mothers would neither ask for nor receive advice from the health worker on what liquid to use. One focus group member said, "The nurses don't tell us anything about what water to use; it's for us to decide. And we don't ask them."

Knowledge of danger signs and treatment of respiratory illness:

According to focus group participants, danger signs for pneumonia include difficulty breathing, pain in the side of the chest, high fever, headache, and lack of appetite. In the home, many types of traditional treatment are used for pneumonia: teas, salt, lemon, camel dung, burned box of sugar, soured milk, eucalyptus leaves, and quinquelib leaves, all of which may either be inhaled or rubbed on the child's chest. Pneumonia is treated at health centers with hermicyne, syrup, goménolée oil, aspirin, and paracetamol, although the men were unaware of the use of goménolée oil. Polio is treated with a vaccine; meningitis with a lumbar puncture; measles with guigalé, fanning millet over the body of the child, and by tourgousséré. Malaria is treated with nivaquine, aspirin, paracetamol, fansidar, tea (gadagui, sanga-sanga, eucalyptus), and "two colors." Women said that they found

medications from the health center and other medications that are sold only through prescriptions in the pharmacy and that prices vary by vendor in the market.

Since people believe the cost-recovery system is expensive, they buy medicine at the market, where they find the same medications as at the health center and pharmacy, and low-cost medications from Nigeria. In Kiota, essential medicines are sold at the community depot, where 100 tablets of cotrimoxazole cost 1,000 CFA (\$1.54). In the market one tablet of cotrimoxazole costs 10 CFA (\$0.02), and in the pharmacy 20 tablets cost 390 CFA (\$0.60). At the health center a child without a health card is charged 400 CFA (\$0.62), and a child with a card is charged 100 CFA (\$0.15) for a visit and medication. The women in the focus groups knew these charges; the men did not.

Mothers believed the combination of many medications for the treatment of one illness was very dangerous for a child's health of because it would cause fatigue, vertigo, and other illnesses. The fathers were divided on the effect of combining medication. Some said that if one type of medication was used and resulted in no improvement in the child's health, the next one would be added, and so on. Others said that doing this was due to ignorance and could worsen the illness: "This is terrible, because even with traditional medicine we are advised not to combine the medicinal products."

Care-seeking behaviors (use of modern versus traditional medicines and modern versus traditional healthcare practitioners/facilities): According to both men and women, the mothers first try to treat the child at the home by giving

either traditional or modern medication. They said, "It is when we see that the child is not improving that we take him to the health center," and "After trying traditional medication, if the child's condition gets worse, she will take him to a health center." The illness starts at this stage, in their view. Table 4 lists factors that prevent or foster the use of health center services, while Table 5 lists factors that favor or prevent the use of modern versus traditional medications. Both tables provide information from focus groups.

The person who makes the decision to take a child to the health center is either the father, the father's parents, or the mother. While the father usually makes the decision, some women asserted the contrary in each female focus group: "One doesn't ask for the advice of the father; the mother decides herself." The male focus groups indicated that the father, as head of the household, made the decision. One woman said, "Some fathers say that if you want, let the child die," and refuse to give any money to the mother.

Compliance with recommended antibiotic regimens for the treatment of pneumonia (barriers, difficulties): According to the women, cotrimoxazole was very convenient and effective. It was considered even more effective than the other essential medications and very easy to use. One woman said, "Cotri helps the small children breathe better." Another said, "It is simpler to use than other medicines." A third said, "It is stronger than the traditional medications." The male focus group members did not know cotrimoxazole by name, but recognized it when they saw it.

Table 4
Factors That Prevent Or Foster Use of Health Center Services

Preventing Factors	Fostering Factors
Cost recovery	Seeking the health of children
Medication that is more costly than in the market	Worsening of a child's health
Lack of money	Advice on the administration of medication
Distance from the health center	The availability of medication
Lack of transportation	The effectiveness of the medicinal products
Mother's negligence	Health education
Poor reception from health workers (male focus group only)	
Lack of medications (male focus group only)	
Having to pay the expenses if a death occurs	
Not enough information	
Not available at night, except for influential people	

Although the women's focus groups agreed that one should follow the directions for giving the full course of medication as described by the health worker, some mothers admitted that they didn't always. "To follow the treatment until it's over is better, but we don't always do it." A male focus group member said that the treatment was followed like a "Foula safari," referring to the way that members of the Peul culture tend to stop a treatment as soon as health returns. Another said that a sick person is impatient, "The

only reason that motivates him is to recover his health. This explains why traditional medicine is used before modern. It also explains why after three days of modern treatment, one would abandon it for the traditional." Another said, "We, the Peuls, whatever illness we have, we take traditional treatment in the hope that after some time the sick person may recover his health."

Opinions on the use of leftover medication were split. Some men wished to keep it for future use. Some women thought it should be destroyed, while others believed it

Table 5
Factors That Favor Or Prevent Use of Modern versus Traditional Medication

Medication	Factors That Favor Use	Factors That Prevent Use
Modern	Easy to use Less risk Good dosage	High cost Not enough money
Traditional	Availability Low cost Poverty Habit For treatment of illness that can't be treated by modern medication	Bad dosage Not always effective

was better to save it and give it later to their sick child or a neighbor's.

Sources of health information and popular communication channels:

The communication channels most trusted by the women are the radio and health workers. The most accessible sources for women are baptisms, the health center, and the well. For men the most accessible sources of communication are the radio and talking together in the evening (Table 6).

Understanding/comprehension of language (written and verbal) and imagery:

Most of the women do not know how to read or write, but some can distinguish certain letters and numbers. In Kiota, the religious center, Arabic is understood and written by most men. Table 7 lists the terms focus group members used to describe good and poor health in children. Both women and men are familiar with certain types of images in their everyday life. The women do not differentiate between a stylistic image and a photographic one. They are, however, familiar with images of polio, diarrhea, AIDS, leprosy, tuberculosis, kwashiorkor, and pregnancy spacing. In this last case the women remembered by name the flip chart developed by the MOH on the Bako family.

VII. Workshop

A two-day workshop in Niger during September 2000 presented the preliminary findings from the research described above and elicited advice from participants on the job aids.

A. Presentation of Results

The workshop presented the results of the qualitative data collected

Table 6
Sources of Health Information

Sources of Health Information	Most Accessible Sources
Health workers	Radio
Radio	Neighbors
Television	Health center
Radio club broadcast	Neighborhood meeting
Damouré ZIKA	Baptism (women)
Public place	
Mosque	
Neighborhood meeting	
Baptism (for women)	
Wives (according to males)	

Table 7
Words Used to Describe Children in Good versus Bad Health

Children in Good Health	Sick Children
The child doesn't stay still	He doesn't eat
He amuses himself (plays)	He doesn't play
He breast-feeds well	He cries a lot
He doesn't cry	He is tense
He eats well	

Participants were asked to participate in the development of strategies for behavior change and key messages for both health workers and mothers.

The workshop was designed to be participatory so that MOH personnel would take an active role. It began with a session on behavior change theory, including the factors that influence behavior change and the steps taken in the adoption of a behavior change. Behavior change strategies were discussed in terms of how they relate to health workers and parents. The next session presented a review of IMCI standards related to counseling parents on the administration of antibiotics to infants and children. These standards were characterized as the "ideal" behavior for health workers. Mahamadou Nadaré led the next discussion and summarized how images are

during the formative research phase. Participants included MOH program directors, regional MOH personnel, and district MOH personnel from Boboye. Also participating was an artist, Mahamadou Nadaré, who had been identified to work on the design and execution of the job aids, in order to ensure his understanding of the key issues. The data collectors attended and helped explain data and respond to questions on the data collection process.

often interpreted and can be misinterpreted. He reviewed cultural symbolism and showed examples of his work to explain the interpretation and development of a concept into an image. The MOH Director of Health Education helped lead this discussion, showing examples of flip charts and other educational materials and explaining how they had been developed.

Next, the workshop presented the objectives of the AMR study along with a global perspective to the study, including the incidence of AMR in Africa and global strategies to prevent it. The study coordinator and data collectors discussed the results from the formative research phase.

Participants discussed the issues before them and identified aspects of the study results that surprised them, based on their own professional experience, including

- Under-utilization of health centers,
- Fathers' irresponsibility when presented with their sick infant,
- Mothers' refusal to pay for health treatment for their infant,
- Health centers as the first site of treatment,
- Lack of follow-up visits for an illness,
- Impact that key informants had on the focus groups (freedom of expression),
- Recognition by mothers of the effectiveness of the health centers,
- Magnitude of self-medication,
- Identification of cases of ARI by the mothers,
- Insufficient explanations of danger signs by the health workers,
- Non-observance of IMCI treatment guidelines by the health workers, and
- Low rate of healthcare services utilization at the introduction of cost recovery and the population's perception of the cost-recovery fees.

Table 8
Workshop Participants' Views of Mothers' Ideal and Actual Behaviors and Barriers/Motivators to Change

Ideal Behaviors	Actual Behaviors
Bring infants to the health center at the first sign of illness	The practice of self-medication
Clearly explain the reason for the visit	Returning late to the health center
Correctly administer the prescription	Bad conservation of medication
Accept the health worker's advice	Nonmastery of the medication dose
Apply the health worker's advice	Failing to return for follow-up
Come back to the health center at the end of treatment	Combining traditional and modern medication
Come back to the health center if the illness worsens	
Keep the medication dry and out of reach of children	
Continue to actively feed the infant	
Follow the prescribed treatment	
Master the prescribed dose	
Crush the medication with a clean spoon	
Use potable water to mix the medication	
Use a spoon or louche to give the medication to the infant	
Master the care of the infant in the home	
Principal Barriers	Principal Motivators
The high cost of medication due to cost recovery	Satisfaction of rendered services
The husband's reluctance	Availability of medication
Financial, geographical, and logistical inaccessibility	Easy-to-use medication
Stock outs of essential medications	
Poor perception by mothers of oral prescriptions	
Illiteracy	
Inappropriate support for health education	

Participants split into small groups and identified what behaviors needed to be changed and what strategies for behavior change could be used to effect the needed changes. To do this, they focused on ideal and actual behaviors of mothers and health workers as well as barriers and motivators to behavior change (Tables 8 and 9).

B. Identifying Key Messages

Small work groups formed near the end of the workshop to determine the most critical/appropriate messages for health workers, mothers, fathers, and community leaders. Key messages were developed, resulting in several ideas for job aids for both health workers and parents. These included (1) a counseling card and poster for health workers highlighting four key messages and (2) a

Table 9
Workshop Participants' Views of Health Workers' Ideal and Actual Behaviors and Barriers/Motivators to Behavior Change

Ideal Behaviors	Actual Behaviors
Have a good attitude from the first patient contact	Good reception, sometimes no greeting
Greet the client and offer her a seat	Poor attitude
Let the client trust you	No invitation to take a seat
Respect confidentiality	No explanation of the illness
Give advice clearly, precisely, and comprehensibly	No explanation of the reason for the prescription
Explain the illness	Explanation of the dosage
Explain the prescription, including the reason for it	No verification of the mother's comprehension
Show the mother each medication	The frustrations
Explain the dosage, the amount, and the method of administration	Insufficient demonstration of the administration of the first dose
Demonstrate administration by giving the first dose	No explanation of the manner in which to store medications at home
Explain the best way to store medication	Insufficient explanation on the importance of following treatment and when to bring the infant back
Explain what to do if the medicine is rejected and that she should re-administer a rejected dose	No explanation of the utility of saving the health card
Tell the mother when to come back for follow-up	
Explain worsening signs and when to return immediately	
Explain how to improve the feeding of the infant and how to prevent illness	
Explain the importance of the health card	
Explain the importance of following the advice given	
Verify the mother's comprehension	
Ask the mother if she has any questions	
Principal Barriers	Principal Motivators
Too much work to do (insufficient personnel in quality and in quantity)	Knowing the importance of monitoring (self-evaluation)
Insufficient training in IPC and IMCI	Good organization of the Basic Package of Services
Unavailability of lab reagents	Training
Insufficient educational aids for ARI	Formative supervision
Insufficient material for the work	Availability of medications and work materials
Appointments that aren't kept	Availability of educational materials and job aids
Lack of use of the guidelines	Willingness/competitiveness
Lack of mastery of the local language	Positive sanctions (from superiors, population)
Stock outs of essential medications	

medication envelope with the same four images for mothers. The groups also developed communication strategies. Responsibility for creating the different job aids and related messages was distributed among the study staff and MOH personnel (Table 10).

C. Conclusion and Sequel

At the end of the workshop, four participants volunteered to participate in a technical committee, which would oversee efforts to transform workshop results into job aids. The committee included the Niger MOH Directors of Health Education, Cost Recovery, ARI, and Health and Reproduction. Participants agreed that the AMR study staff would proceed in close collaboration with the technical committee to develop images and text for the job aids, pretest the job aids, and provide training in IPC and IMCI.

An evaluation revealed that the workshop participants appreciated the rapid feedback of study results in the workshop format where those present had been observed and/or could make some of the changes recommended. Some of the comments in the evaluation stated that qualitative research could be put into action more quickly than quantitative research surveys. They also indicated how important it was to conduct this type of research before designing educational materials in order to understand what the local population is thinking. One participant wanted to use this same methodology to develop educational materials for HIV/AIDS. Some participants requested a similar workshop after the completion of the intervention.

VIII. Designing the Job Aids

During the workshop, messages and strategies were developed for each audience (mothers, fathers, health

workers, and community leaders). The artist worked with study staff to develop and execute the concept for a visual image for each message. The artist used pictures taken by study staff of health workers in their

consultation rooms and women holding children to develop the first images. The artist and study staff reviewed other educational materials developed by BASICS, Management Sciences for Health, the national

Table 10
Key Messages and Strategies by Audience and by Responsible Organization

Key Message	Strategy	Responsible Organization
Mothers/caretakers		
1. A. Importance of administering the correct dose of cotrimoxazole (1 or ½ tablet at a time) B. Importance of providing it twice a day C. Importance of providing the entire treatment (5 days)	Job aid (envelope)	QAP
2. Importance of using the back of a spoon to crush the tablet and clean water (tap water, forage, or well water)	Job aid (envelope)	QAP
3. Importance of giving all of the medication, making sure that the infant swallowed everything	Job aid (envelope)	QAP
4. Importance of keeping the tablets in a dry place, out of the reach of children	Job aid (envelope)	QAP
5. Importance of finishing the entire treatment even if the child gets better	Job aid (envelope)	QAP
6. Importance of bringing the child back to the health center as soon as there is any danger sign (lethargy, inability to drink or nurse, rapid and difficult respiration, high fever, or convulsions)	IMCI counseling card	National IMCI program
7. Importance of continuing to feed an ill child	IMCI counseling card	National IMCI program
Fathers		
1. Participate actively in the management of the ill child	Regional radio	DES
Community leaders		
1. Appeal to parents' conscience in the management of their sick child	Regional radio	DES
Health workers		
1. Practice good IPC (dialogue going both directions, simple explanations, treat with respect, listen attentively and actively, etc.)	Training in IPC Job aid (poster)	DES and QAP
2. Make sure that the mother understands the messages about the dose, number of doses per day, and the duration of the treatment in days	Job aid (envelope)	QAP
3. Ensure that the mother understands the messages about the use of clean water, making sure the infant swallows everything, and keeping the tablets in a dry place out of the reach of children	Job aid (counseling card)	QAP
4. Explain the necessity of finishing the treatment	Job aid (counseling card)	QAP
5. Demonstrate administering the first dose to the mother	Job aid (counseling card)	QAP
6. Make sure the mother understands the messages about danger signs and continuous feeding of the child	IMCI counseling card	National IMCI program

Note: DES is Department of Health Education

IMCI program, etc. Since two messages were already addressed by the IMCI counseling card (danger signs and infant feeding), the artist focused on developing illustrations for the remaining messages. As a result, a set of five images and one graphic design were drafted and submitted to the technical committee for review.

A counseling card for health workers was developed from the set of five images; it contained four images depicting messages on how to 1) crush, 2) administer, and 3) store the antibiotic and to complete the entire five-day regimen. The reverse of the card had text prompting health workers to deliver messages adapted from the national IMCI norms. The fifth image was used for a poster and depicted a health worker counseling a family using good IPC skills. The same four images depicting proper administration of the antibiotic were also repeated on the poster.

An envelope for mothers was developed to hold the cotrimoxazole. One side had the graphic design that indicated the dose, frequency, and number of days the medication should be taken. The reverse repeated the four images from the health worker counseling card and poster.

The technical committee met twice after the workshop to review all the materials. Five days after the workshop, the committee reviewed the first draft of images and gave feedback to the artist.

A. Pretesting

The proposed counseling card, poster, and envelope were pretested in Dosso and Boboye. All three were tested with health workers in Dosso, a district adjacent to Boboye. The

images and envelope were tested with mothers in three focus groups in and near Boboye (see Appendix D). A draft of the counseling card was produced in black and white and laminated for review by the health workers, as was a black and white version of the proposed poster. Both the poster and the counseling card were only tested with the health workers. Health workers were also asked about usage of the IMCI counseling card for danger signs and infant feeding.

Black and white photocopies of all images were given to focus group participants. Multiple copies of the test envelope were distributed so that participants could look at each image and manipulate the envelope as they answered questions and offered feedback. A laminated color version of each image was passed among the participants to elicit their reactions to the colors.



The counseling card, poster, and envelopes were pretested with health workers.

The pretest results were very positive. The messages depicted with images and no words were clearly understood by both the health workers and the focus group participants. Mothers and health workers reacted enthusiastically to the proposed envelope, offering multiple reasons why it would be



A focus group participant pretests images.

useful. Specific recommendations to strengthen the visual messages and to improve the comprehension and/or attractiveness of the images included (1) changing the position of the father in relationship to the mother and child in one image where the father was observing the administration of the antibiotic to the child, (2) having the mother sit on a mat on the ground rather than in a chair while preparing and administering the antibiotic, and (3) depicting a more traditional clean water source: a well rather than a faucet.

The graphic design depicting frequency and duration of antibiotics was understood by both groups. A suggestion was made to substitute an image of late afternoon for that of evening (with the moon over a traditional house). Both groups endorsed the colors the artist had selected. (Color was used only in the counseling card and poster to limit costs.) The technical committee met immediately after the pretest and reviewed its results. They made final decisions on which revisions to

accept and composed text for the counseling card. After those revisions, another field test of the images was conducted with mothers and health workers. The results indicated that the images were clearly understood, and no further changes were made.



Final Image 1: Preparing the antibiotic in the home

Recommended changes to Draft Image 1:

- The mothers and health workers endorsed the position of the infant;
- Have the woman sit on a mat to give the picture a rural feeling;
- The mothers understood that the medication was being crushed in a louche;
- The mothers understood that the faucet image was about clean water, but asked that a bored well also be shown;
- Cover the cup or replace it with a glass; and
- Revisit the representation of the envelope (it has to contain the pills).



Final Image 2: Administration of the medication

Recommended changes to Draft Image 2:

- Have the woman sit on a mat,
- Take the envelope out of the hands of the husband,
- Have the husband to the side, slightly leaning towards his wife (in rural areas the husband does not publicly get as close to his wife as was portrayed in the original image), and
- Replace the child's head with the one in Image 1.



Final Image 3: Storage of medication in a dry place out of reach of children

Image 3 was understood completely, and no changes were recommended.



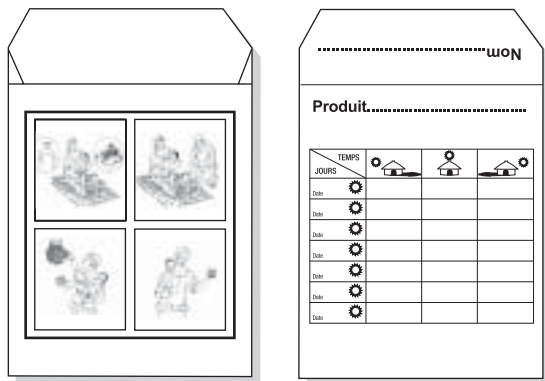
Final Image 4: Mother and child at the end of treatment

For Draft Image 4, the focus group participants did not understand that the original envelope was actually empty. The position of the envelope was revised so that it more closely resembled the envelope in Images 1 and 2.

Time	☀️🏠	🌞🏠	🌙🏠
Days			
Date	☀️		
Date	☀️		
Date	☀️		
Date	☀️		
Date	☀️		
Date	☀️		
Date	☀️		

Final Image 5: Symbols for the day and intervals during the day

The symbols in Draft Image 5 were generally understood, but it was proposed that the one for “night” be changed to show a setting sun, rather than the original dark sky and moon.



Final envelope front and back

B. Final Envelope

The purpose of the envelope was quickly understood by both mothers and health workers. Health workers suggested adding places where the date of the consultation, the name of the infant, and the prescribed medication could be recorded. The health workers and women were divided on who should mark the spaces corresponding to the dosage: the health worker during the counseling session or the mother as she administered each tablet.

C. Final Counseling Card

The health workers found the image side of the counseling card was complete and that its reverse was simple to read. They suggested, however, that the text should be easier to read and suggested color to highlight the content. They disagreed on whether to leave the text in French or translate it to the local language. One thought that the content of the instructions should be reviewed in relation to the national norms, which the technical committee did.

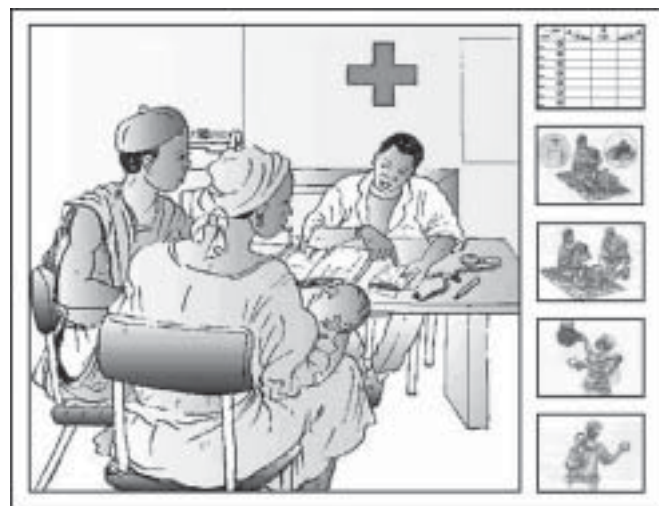
D. Final Poster

The full-color poster was 23 inches wide and 17 inches high and had no

text. The health workers expressed interest in having the written instructions from the back of the counseling card on the poster. They said that the smaller pictures would facilitate counseling and that the larger one could be posted on the consultation room wall.

IX. Training Materials for Introducing Job Aids and Improving IPC

After pretesting, training materials were developed to support implementation of the job aids. Use of the counseling card was tailored to incorporate it into normal clinic operations. The technical committee decided to reinforce the use of the IMCI counseling card for danger signs and infant feeding during the job aid training. Since the study results indicated that health workers needed better IPC and counseling skills, a training curriculum for IPC and use of the job aids to improve counseling for an antibiotic regimen was developed with the MOH Director of Health Education and



Final poster

QAP. Manuals from IPC curricula that had been developed by the United Nations Children's Fund (UNICEF) and the German Agency for Technical Cooperation (GTZ) for use in Niger and a QAP training module, "Improving Interpersonal Communication Between Health Care Providers and Patients," were reviewed and adapted/incorporated into the development of a new manual.

While all Boboye health workers had been trained in IMCI two years before, turnover had resulted in only half of all health workers having been trained. A meeting with the deputy coordinator for IMCI and an IMCI national trainer to discuss the possibility of enrolling the Boboye health workers in the next IMCI training indicated that financing training for new Boboye health workers was problematic. Although the training schedule had already been determined, the coordinator and trainer agreed that several health workers could be added to the December class; however, funding these trainees was not possible.

X. Discussion

The job aids described in this report were designed to improve health worker patient counseling and caretaker adherence to an antibiotic regimen. The counseling card and poster were designed to improve health worker counseling, and their images were repeated on the medication envelope given to mothers. These are two key strategies to reduce the spread of AMR.

A third strategy, the palatability and acceptability of cotrimoxazole, the first line drug for treatment of pneumonia in children in Niger, was not a problem. Caretakers found it convenient and effective. Children liked its taste, and mothers believed that it cured disease. The cost of obtaining cotrimoxazole at the health center was a barrier to use. Since it was also sold in the market for less than at the health center, some families simply purchased it there, without the benefit of a diagnosis or treatment plan.

Occasional stock outs of cotrimoxazole and other medicines at health centers would also discourage visits to health centers and cause health workers to dispense less than the full regimen at the first visit. Requiring caretakers to return in two to three days for the rest of the medication sometimes resulted in a shortened course of treatment (Edson et al. 2003).

This report demonstrates that key messages on adherence to an antibiotic regimen can be conveyed to largely illiterate caretakers through images and their reinforcement with verbal messages from health workers.

The use of vaccines, another key strategy to decrease antimicrobial resistance, is currently not feasible in Niger as neither the *Haemophilus influenzae* type b nor the pneumococcal vaccine is in widespread use.

Sustainability was foremost in everyone's mind. Color was not used for the envelopes to limit their cost (\$0.07 each). Printing more envelopes would decrease the per piece cost. MOH personnel were involved at every stage, took responsibility for implementing the IPC training and complementary radio broadcasts, and maintained technical oversight in the development of the job aids. Counseling cards developed by the national IMCI program on danger signs and infant feeding were incorporated into the job aids training to reinforce their use.

The job aids were created in two months: Data collection took one month; data analysis, development of key messages, creation, and pretesting the job aids took a second. Edson et al. (2003) report the effectiveness of the job aids in improving caretaker adherence to the antibiotic regimen and improving health worker counseling.

References

- Attama S, Seroussi M, Kourguéni AI, Koché H, and Barrère B. 1998. *Enquête Démographique et de Santé, Niger 1998* (Demographic and Health Survey, Niger 1998). Calverton, MD: Care International/Niger and Micro International Inc.
- Doern GV, Brueggermann Q, Holley HP, and Rauch AM. 1996. Antimicrobial resistance of Streptococcus pneumonia recovered from outpatients in the United States during the winter months of 1994 to 1995: Results of a 30-center national surveillance study. *Antimicrobial Agents & Chemotherapy* 40(5):1208–13.
- DSNIS (Direction du Système National d'Information Sanitaire). 2000. *Enquete sur les indicateurs sanitaires et sur la satisfaction et le comportement des clients dans les departements cibles du projet sante 2*. Niamey, Niger.
- Edson WN, Boucar M, Djibrina S, Mahamane I, and Ware H. 2003. Improving adherence to cotrimoxazole for the treatment of childhood pneumonia in Niger, *Operations Research Results* 2(10, revised). Bethesda, MD: Published for the United States Agency for International Development by the Quality Assurance Project.
- Edson WN, Koniz-Booher P, Boucar M, Djibrina S, and Mahamane I. 2002. The role of research in developing job aids for pneumonia treatment in Niger. *Int J Quality in Health Care* 14-S:35–45.
- Ellison RS and Altemeier WA. 1982. Effect of use of a measured dispensing device on oral antibiotic compliance. *Clinical Pediatrics* 21(11):668–71.
- Green L, Kreuter M, Deeds S, and Partridge K. 1980. *Health Education Planning: A Diagnosis Approach*. Palo Alto, CA: Mayfield Press.
- Hoppe HL and Johnson CE. 1998. Otitis media: Focus on antimicrobial resistance and new treatment options. *American Journal of Health-System Pharmacy* 55(18):1881–97.
- Huebner RE, Wasas A, Mushi A, Mazhani L, and Klugman K. 1998. Nasopharyngeal carriage and antimicrobial resistance in isolates of Streptococcus pneumoniae and Haemophilus influenzae type b in children under 5 years of age in Botswana. *International Journal of Infectious Diseases* 3(1):18–25.
- Kerstiëns B, Akii A, Mbona N, Zziwwa A, and Edson WN. 2003. Improving the management of obstetric emergencies in Uganda through case management maps. *Operations Research Results*. Bethesda, MD: Published for the United States Agency for International Development (USAID) by the Quality Assurance Project.
- Knapp KM and Schutze GE. 1997. The approach to treatment of invasive pneumococcal disease in the 1990s. *Journal of the Arkansas Medical Society* 94(6):263–66.
- Knebel E. 2000. The use of manual job aids by health care providers: What do we know? *Operations Research Issue Paper* 1(1). Bethesda, MD: Published for the United States Agency for International Development (USAID) by the Quality Assurance Project.
- Koornhof HF, Wasas A, and Klugman K. 1992. Antimicrobial resistance in Streptococcus pneumoniae: A South African perspective. *Clinical Infectious Diseases* 15(1):84–94.
- Lahaie J, Burkhalter B, and Kelley E, eds. 2001. *Proceedings of a Job Aids Symposium, May 24, 2001, International Trade Center, Washington, D.C.* Co-sponsored by the Quality Assurance Project and the CORE (Child Survival Collaborations and Resource) Group, and published for the United States Agency for International Development by the Quality Assurance Project, Bethesda, MD. Available at www.qaproject.org/methods/resources.
- McMahon SR, Rimsza ME, and Bay RC. 1997. Parents can dose liquid medication accurately. *Pediatrics* 100(3 Pt 1):330–33.
- Moore T. 2001. State of the art in job aids: What they are and what we know. In: Lahaie J, Burkhalter B, and Kelley E (2001) above, pages 21–36.
- Nisal J, Musal G, Rahim M, and Rasmussen ZA. 1997. Development of health education materials on appropriate drug use for illiterate mothers in the northern areas of Pakistan. Poster presentation, ICIUM (International Conference on Improving Use of Medicines), Chiang Mai, Thailand.

-
- Prochaska JO and DiClemente CC. 1986. Toward a comprehensive model of change. In: Miller WR and Heather N, eds. *Treating Addictive Behaviors*. New York: Plenum.
- Rogers EM. 1995. *Diffusion of Innovations*. New York: The Free Press.
- Scott JA, Hall AJ, Hannington A, Edwards R, Mwarumba S, Lowe B, Griffiths D, Crook D, and March K. 1998. Serotype distribution and prevalence of resistance to benzylpenicillin in three representative populations of *Streptococcus pneumoniae* isolates from the coast of Kenya. *Clinical Infectious Diseases* 27(6):1442–50.
- Tavrow P, Shabahang J, and Makama S. 2002. Vendor-to-vendor education to improve malaria treatment by drug outlets in Kenya. *Operations Research Results* 2(2). Bethesda, MD: Published for the U.S. Agency for International Development (USAID) by the Quality Assurance Project. Also reported in the *Malaria Journal* 2003, 2:10, available at <http://www.malariajournal.com/content/2/1/10>.
- USAID (United States Agency for International Development). 1998. Reducing the threat of infectious diseases. Washington, DC: USAID's Initiative to Prevent and Control Infectious Diseases.
- WHO (World Health Organization). 2001. *WHO Global Strategy for Containment of Antimicrobial Resistance*. Geneva: WHO: http://www.who.int/emc/amrpdfs/WHO-Global_Strategy_English.pdf (Accessed June 2002).

Appendix A: Focus Group Instrument

Theme 1: Knowledge and attitudes concerning childhood illnesses in general

- 1.1 Do you believe the majority of infants in Kiota are healthy or ill during most of the year?
- 1.2 What do you think are the periods of the year when children are most often sick?
- 1.3 What childhood illnesses are most frequent here? (List)
- 1.4 What medications can you give a child for each of the illnesses listed?
- 1.5 At what state of illness do you take a child to a healthcare provider (traditional or modern) for treatment?
- 1.6 What medications are available at the health center for the illnesses listed above? What is the price for each?
- 1.7 What medications can you find at the local market and at a pharmacy? What is the price there?

Theme 2: Knowledge of danger signs and treatments for ARI

- 2.1 How can you distinguish the different stages of ARI?
- 2.2 What danger signs of pneumonia do you know?
- 2.3 Can you describe how to treat different ARIs at home?
- 2.4 Can you describe how different ARIs are treated at a health center?

Theme 3: Care-seeking behaviors (using traditional health services versus modern healthcare services and traditional products versus modern products)

- 3.1 Utilization of health services
 - 3.1.1 What are the barriers to using local health services (distance, cost, time, etc)?
 - 3.1.2 What are the principal reasons for sending a child to the health center?

- 3.1.3 Who makes the decision to take the child to the health center or not, the mother, father, or others)?

3.2 Utilization of medications

- 3.2.1 What do you think of combining several medication to treat one illness?
- 3.2.2 What medications (modern and traditional) do you usually give to your children? Why do you use them? Where do you get them? How to you administer them and for how long?
- 3.2.3 What are the principal factors that favor using modern/traditional medicines (availability, cost, source, etc.)?
- 3.2.4 What are the principal factors that impede using modern/traditional medications (availability, cost, source, etc.)?

Theme 4: Adherence to regimes for the antibiotic treatment prescribed for pneumonia (barriers and difficulties)

4.1 Utilization of antibiotics

- 4.1.1 What do you think of the utilization of cotrimoxazole compared to other medications (modern and traditional) for treating ARI or pneumonia?
- 4.1.2 How do you feel about giving cotrimoxazole to your children? Are you hesitant, especially in giving it to infants?
- 4.1.3 If the symptoms of an illness go away before you finish the prescription for cotrimoxazole, do you stop the treatment or continue until the pills are gone? Why?
- 4.1.4 What do you think should be done with medication left over after treating a child with pneumonia (destroy it, keep it to use later, give it to another, sell it, or other)?

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- 4.2 Preparing the antibiotic solution for children and infants
 - 4.2.1 How do you administer the tablets to your children? (Please demonstrate.)
 - 4.2.2 With regard to prescriptions that a child drinks, do you ask the health worker what kind of water to use for the mixture?

Theme 5: Sources of health information and community communication channels

- 5.1 Where do you get information and advice regarding health?
- 5.2 In what sources do you place the most confidence (family, friends, neighbors, religious leaders, community leaders, traditional practitioners, health workers, media)?
- 5.3 What are the local communication channels available to men (radio, local theater, radio-clubs)? When during the day and where are these channels available?
- 5.4 What are the local communication channels available to women (radio, local theater, radio-clubs)? When during the day and where are these channels available?

Theme 6: Comprehension of language and images

- 6.1 What are the words used in the local language to describe a well child? An ill one?
- 6.2 What are the different words used in the local language to describe different respiratory illnesses: rhumatism, cough, bronchitis, pneumonia, others?
- 6.3 Are most caretakers in your community able to read and write and/or to distinguish specific letters and figures?
- 6.4 What types of images do caretakers regularly see in their daily lives (include the observation of images seen in homes or neighborhoods)?

Appendix B: Key Informant Interview Guide

District : _____	Boboye _____	Date: __/__/__	Start time: _____
Name of interviewer: _____	Name of informant: _____		
Sex: _____	Age (in years): _____		

1. Do you think most children in Birni are well or ill during most of the year?
2. Are there periods of the year when children are more often ill?
3. What are the childhood illnesses you see most often in your community?
4. What treatment do parents usually use to care for their children? Why?
5. Are there varieties of medicines (modern and traditional) that caregivers provide to infants?
6. What are the different places where parents buy medicines?
7. What medicines are most often available?
8. What factors favor using local health services?
9. What factors impede using local health services?
10. What types of problems affect the health of children you see in your work?
11. What comparison can you make between traditional and modern treatment for respiratory illnesses?
12. Who decides whether to take a child to the health center (the mother, father, or others)?
13. Where can parents receive information and advice regarding health?
14. What sources of information and advice are most accessible for them?
15. In what source of information do they place the most confidence? Why?
16. Can you tell us the different communication channels used by men and those used by women?
When during the day and where are these channels available?
17. What are the words in the local language used to describe the different respiratory illnesses: rheumatism, cough, bronchitis, pneumonia, others?
18. What kinds of images are people used to seeing during their daily lives?
19. Do heads of households permit researchers to implement home visits?

END OF INTERVIEW

Time of conclusion of interview: _____ Length of interview: _____

Appendix C: Draft of General Aspects of Data Collection of Key Informants

1. Is cotrimoxazole in tablet form the only antibiotic prescribed for children with pneumonia?
2. Are all health workers frequently trained on the national norms for the treatment of pneumonia with cotrimoxazole tablets (1/2 tablet twice a day for five days for children two months to a year; one tablet twice a day for five days for children one to five years)?
3. Are cotrimoxazole tablets wrapped in a paper cone by health workers and given to children's caretakers? How are the different doses administered to children under 12 months and those older than 12 months: For example, are caretakers of younger children given half tablets, or whole tablets and instructions to split each in two?
4. Who is responsible at the health center for giving medicines to caretakers of children?
5. Who is responsible for giving advice to caretakers of children on the administration of medicines?
6. Have the healthcare workers received training in IMCI? If so, to what extent do their job descriptions and daily activities include diagnosis, classification, treatment and referral of patients with ARI? When were they trained and by whom?
7. Have they received training in interpersonal communications? When and by whom?
8. Do healthcare workers understand the importance of adherence to the prescribed treatment regime and the consequences of failure to adhere?
9. Are healthcare workers always able to correctly give key verbal messages concerning the treatment regime to caretakers of children diagnosed with pneumonia? If not, what are the reinforcement messages?
10. Do healthcare workers give coherent messages to caretakers of children with pneumonia concerning the treatment regimen? If so, what is said and with what degree of coherence and regularity? If not, what prevents them from doing so (time, motivation, ignorance of their role as counselors, lack of material resources, language problems, others)?
11. Do healthcare workers always write instructions on the paper cones to help caretakers remember the dosage, how to mix it with water, when during the day to administer the medicine, and for how many days? If not, what prevents them (time, motivation, illiterate caretakers, others)? If so, how, who and with what degree of coherence and regularity?
12. Do healthcare workers give instructions on how to grind the tablet, including the type and quantity of liquid to use for mixing and what to use to grind it? If so, with what degree of coherence and regularity?
13. Do healthcare workers demonstrate how to grind the tablet and mix it with liquid before giving it to children? If so, how and with what degree of coherence and regularity?
14. Are caretakers told that they must return for the follow-up visit after completing treatment?
15. How likely is it that caretakers will return for follow-up after the healthcare worker requests it? What are the factors that impede caretakers from returning for the follow-up?
16. What happens to the child with pneumonia whose health is not improved by the check up after completing treatment? Are caretakers asked about the instructions they received on the treatment? Do they receive additional tablets and advice on adherence? Is a stronger medicine (second line) prescribed or is the child referred?
17. What difficulties are there in finding and working with caretakers at their homes?
18. Are caretakers allowed to go for the follow-up visit?
19. What is an incentive that could be offered to caretakers to participate in the study?
20. What are the experiences of the research team in this study or similar ones?
21. What incentive should be offered to investigators?
22. What are the busiest days at the health center?

Appendix D: Focus Group with Caregivers to Pretest Job Aids

Note to facilitator: Introduce yourself and each person on the research team. Explain that we are working on a project to help improve the health of children in the community and that we need the advice of mothers from this community on some images that an artist has created. Explain that we are going to look at and discuss several images and that it will take about an hour. Ask permission to use a tape recorder and to take photographs. If anyone says no, we will not tape record the focus group and/or take photographs.

Give each mother a copy of the first illustration in black and white, and give them several minutes to examine it.

ILLUSTRATION #1

Comprehension

1. Describe what you see in this picture. What do you think is happening here? (What do you think this person [these people] are doing?)

Attractiveness

2. What do you like most about this picture and what do you like least?

Acceptance

3. Is there something about what is shown here (or about what the person[s] is [are] doing) that might upset or not seem right to some people in this community? What about it is not right?

Involvement

4. Where do you think the people and things shown in this picture are from? (1) The country, (2) the city, (3) the neighborhood, or (4) some other place (please specify)
5. Why do you think these people are from _____ (indicate the place mentioned in the previous response)?
6. Do these people appear to be like those from your community? How are they alike and how are they different?

Inducement to Action

7. What do you think this picture is suggesting that you do? What do you think about that?
8. Would you be willing to do what the woman in the picture is doing?

General Comments

9. Do you think this picture might upset or offend anyone in this community?
10. How could this picture be improved?

Note to facilitator: If there was any confusion over the image about using clean water, show the alternate image of the water source and ask if it would be a better way to represent clean water.

ILLUSTRATIONS #2–6

Note to facilitator: Give each mother a copy of the illustration that you are going to discuss and allow time for her to look at it before asking questions. Repeat questions 1 through 10.

COLOR VERSION OF IMAGES #1–5

Note to facilitator: Show the color version of the picture by walking around and letting each person take a look. Then, put the image where it can be seen during the discussion.

11. What do you think about the colors that are used in this picture (image)? Do you think the colors are pretty or not?
12. Would you prefer different colors? What do you suggest? Where? **Note to facilitator:** Make specific notes about any recommended changes in colors.)

ENVELOPE FOR ANTIBIOTIC

Now we would like to ask your opinion about a small product that might be given to mothers at the health clinic.

Note to facilitator: Give each mother a copy of the envelope to examine. Allow several minutes for the mothers to examine the product.)

This is a new form of a paper cone for medicine. **Note to facilitator:** Put some antibiotic in one envelope to show them how it would be used.

Comprehension

Let's look at the side with many pictures that we saw before. **Note to facilitator:** Indicate the side with the dose, frequency, and duration.

1. Describe all the images you see here? What do you think these images mean all together?
2. Do you think that people in this community will like these images? Why or why not?